

ONTARIO. MINISTRY OF THE ENVIRONMENT

ALGAE COUNTER'S REVIEW

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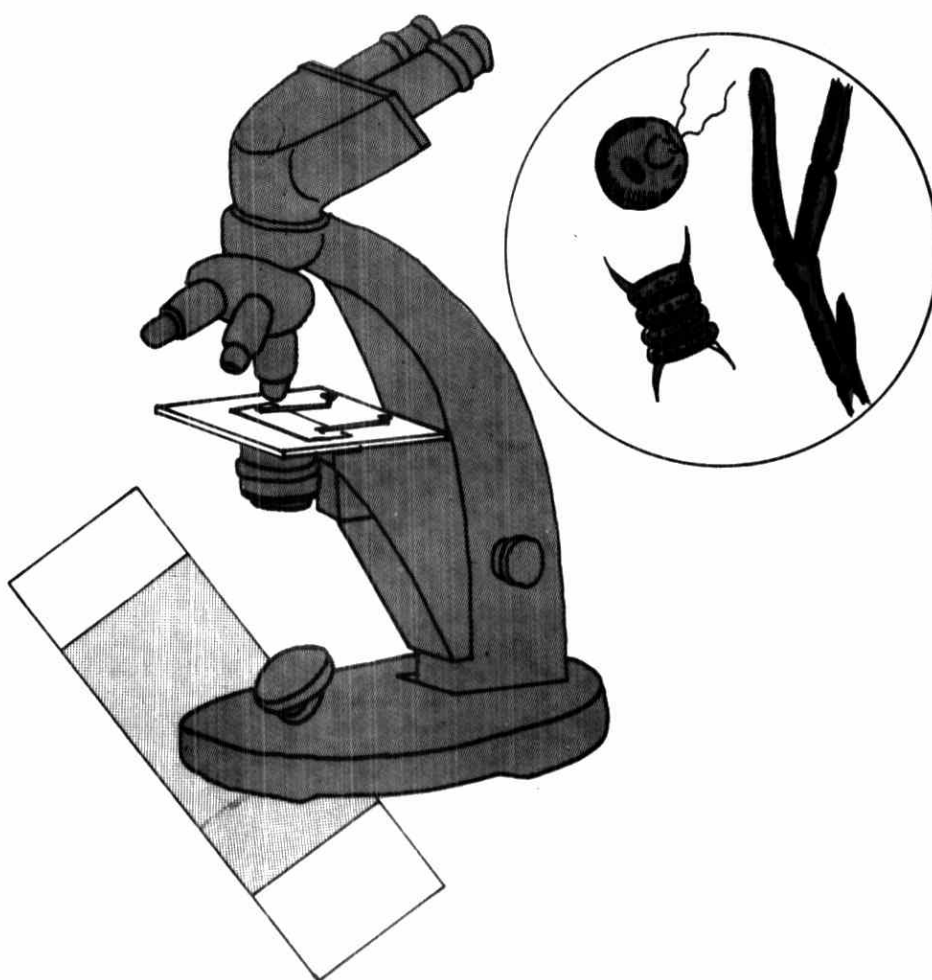
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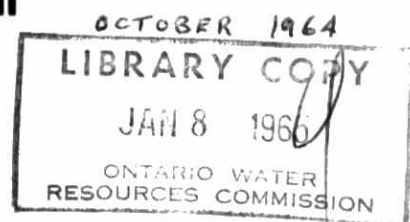
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ALGAE COUNTER'S REVIEW

A BULLETIN PREPARED FOR MUNICIPALITIES WHICH HAVE
ESTABLISHED A REGULAR ALGAE COUNTING PROGRAM



Ontario Water Resources Commission
Division of Laboratories
Biology Branch



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WHY THE ALGAE COUNTER'S REVIEW ?

Two courses in algae identification and enumeration were offered by the Biology Branch of the Ontario Water Resources Commission during 1963. A third similar course was offered between April 27 and May 1, 1964. As most of the participants in these courses are probably aware, the primary purpose of this type of instruction is to enable water works operators to identify and enumerate algae and to promote a better understanding among water works operators of the significance of algae as they affect water treatment processes, and of the remedial measures that may be implemented to offset algae-caused problems.

The purpose of this informal bulletin is to provide a means of contact between the Biology Branch of the OWRC and those municipalities that have personnel undertaking algae counts on a regular basis. Since copies of counts made at these municipalities are forwarded to us, we are able to evaluate them, relate them to specific problems that have occurred at certain times, and make the information concerning these relationships available to all co-operators. Also, this bulletin will provide a means of informing co-operating municipalities of the results of investigations undertaken by OWRC personnel throughout the province with respect to problems caused by algae, and of the success of any corrective measures employed to offset accompanying troublesome conditions such as production of taste and odours and clogging of filters.

There will be no set schedule for the preparation and distribution of this bulletin. Worthwhile information will be accumulated and retained on file and a bulletin will be prepared using this material, several times a year. We trust that co-operators in this program will find 'The Review' to be of value and we would appreciate receiving any comments or suggestions you may have to improve its quality.

October, 1964.

INTEREST IN ALGAE COUNTING INTENSIFIES

Many municipalities are beginning to realize the importance of having information related to algae conditions in supplies drawn from surface waters. Weekly counts at least are undertaken by some municipalities and many plant superintendents ensure that the raw water is looked at every day. Such a practice ensures that no algae can develop to a troublesome degree without the plant personnel being aware of it. Following is a list of municipalities that have persons undertaking algae counts. Perhaps some exchange of information among the water works personnel in this group might be forthcoming as similar problems may develop in different areas.

<u>Municipality</u>	<u>Source of Supply</u>
Belleville	Bay of Quinte (L. Ont.)
Cornwall	St. Lawrence R.
Dunnville (OWRC plant)	Lake Erie
Goderich (OWRC plant)	Lake Huron
Hamilton	Lake Ontario
Kingston	Lake Ontario
Peterborough	Otonabee R.
Port Arthur	Lake Superior
Smith Falls	Rideau River
Sudbury	Ramsey Lake
Union Water System (OWRC plant)	L. Erie
Windsor	Detroit River

DINOBYRON AND TROUBLESOME SYNURA AT BELLEVILLE - C. F. Schenk, Biology Br.

Offensive odours in the water supply at Belleville in the latter part of February and early in March prompted officials of that municipality to call upon the OWRC to investigate the problem. Mr. Aki Oda of the Purification Processes Branch and the writer spent two weeks in an effort to determine how a more palatable water might be produced under the conditions present.

It was determined that Dinobryon and Synura were responsible for causing the offensive grassy, cucumber and fishy odours that prevailed at different times

throughout the period of study. About March 11, when the water had an approximate threshold odour value of 50, Synura had reached a level of 368 areal standard units per ml. Attention was devoted to the use of break-point chlorination and potassium permanganate for odour control on a plant scale, and the use of chlorine dioxide and activated carbon was experimented with in bench tests. The threshold odour level was reduced to approximately 5 with break-point chlorination and this technique was adopted to provide relief until the troublesome algae disappeared. Activated carbon also appeared to be very promising from the experiments conducted, but modifications in the plant would be required to use this chemical.

Belleville takes its water from the highly productive Bay of Quinte and they are now experiencing the high diatom populations that develop there during the spring period, and which prevail throughout the summer and fall. Were it not for the micro-strainer installed at Belleville several years ago, the provision of sufficient water during times of peak summer demand would be well-nigh impossible. The situation at Belleville will be investigated two or three times again this year so that recommendations may be formulated for producing consistently palatable water.

TASTE AND ODOUR CONTROL USING POTASSIUM PERMANGANATE - Aki Oda

Many of those waterworks which depend on surface waters as a source of supply experience some taste and odour problems at one time or another during the year. The unusual flavours in the water supplies are generally caused by organic contamination resulting from one or more of the following: Algae, actinomycetes, decayed vegetation, sewage and industrial wastes.

Recently there have been many reports published in the waterworks literature concerning the success of potassium permanganate treatment in controlling taste and odour conditions at a number of water works in the United States.

October, 1964.

- 3 -

Like chlorine, chlorine dioxide and ozone, other chemicals that are employed in water treatment, potassium permanganate is a strong oxidizing agent. It is capable of destroying some of the taste-and odour-causing substances by oxidation. It breaks down these substances into by-products which are either less odorous or do not form any odorous compounds with chlorine.

In 1963, experiments with potassium permanganate were conducted under the guidance of the OWRC at water treatment plants in Chatham and in Peterborough. Both of these plants had experienced severe taste and odour problems. Controlled dosages of chemical were applied to the treatment process on a plant-scale basis. In order to evaluate the effectiveness of this treatment, threshold odour tests were performed on samples before and after the application of potassium permanganate.

At Chatham, a marked improvement in the palatability of water was noted after treatment with 0.75 ppm of potassium permanganate. There was a noticeable improvement in the flocculation. This method of treatment has now been adopted for use at Chatham whenever objectionable tastes and odours are encountered in the water supply.

Although bench tests showed a good reduction in odour levels with the application of less than a 1.0 ppm dosage at Peterborough, the potassium permanganate treatment was not recommended because this plant did not have the proper facilities to obtain the best advantages from it.

Two basic requirements in a plant must be met before the use of potassium permanganate can be considered. These are as follows:

a) Good filters - since potassium permanganate itself forms insoluble manganese oxide hydrate upon reduction, the plant must be equipped with good filters to remove it. If any unreacted potassium permanganate or any manganese compound pass through the filters into the distribution system, it can lead to troublesome staining problems.

b) Adequate detention time - It is recommended that a contact time of at least one to one and one-half hours is required between the time of application in the rapid-mix and the time to reach a point located about three-quarter ($3/4$) of the way through the sedimentation basins. This means that the colour zone (characteristic pink colour of the potassium permanganate) should persist up to that point for a period of at least one to one and one-half hours and then disappear.

Also, the dosage of potassium permanganate must be properly regulated so that excessive amounts do not pass through the filters in the unreacted forms.

FOLLOW-UP VISITS BENEFICIAL.

After each of the three algae counting courses that have now been held, follow-up visits by personnel of the Biology Branch to co-operating municipalities were made, to assist them in commencing a routine algae counting program. Cornwall, Sudbury, Kingston, Peterborough, Smiths Falls, Goderich, Dunnville and Union have all been visited for this purpose. Counts have been completed at Hamilton, Belleville and Windsor for some time. These municipalities co-operate by providing information to the Commission in order to increase the scope of our program related to accumulating data on algae conditions in surface waters throughout the province.

These visits provide the opportunity for us to verify the identifications made by individual algae counters and to review procedures and provide corrective suggestions when necessary.

REPORT FORMS AND BENCH SHEETS AVAILABLE

A generous supply of algae report forms and bench sheets are kept on hand by the Biology Branch so that they can be made available to persons undertaking algae counts throughout the province. If you need these at any time, just drop us a short note or indicate your requirements on a report form when you are forwarding one to us.

SYNURA AGAIN THE CULPRIT -
THIS TIME AT ESPANOLA

Synura reached high levels during the latter part of May and early June in Apsey Lake, source of water for the Town of Espanola. Severe limitations were faced by OWRC personnel in their attempts to alleviate the malodorous condition of the water since chlorination is the sole treatment procedure used for this supply.

However, increasing the chlorine dosage to meet a substantial chlorine demand and to produce a residual of .75 ppm helped to minimize the severity of the odour problem.

Substantial relief from the problem had resulted by June 10 when the surface water temperature had warmed up to 66°F. Synura is nearly always reported to be a problem during spring and fall, when cooler water temperatures prevail.

WATERWORKS' OPERATORS NOT THE ONLY
PERSONS BOTHERED BY ALGAE

The summer of 1964 has been a particularly troublesome season for nuisance conditions associated with the development of filamentous algae in surface waters throughout the Province. The

greatest offender has been the green filamentous alga, Cladophora, which grows profusely on rocky-type bottoms along the shores of Lake Erie and Lake Ontario, as well as along some sections of the St. Lawrence River.

Huge accumulations of Cladophora may drift ashore in bays and along beaches after becoming detached during periods of stormy weather. Decomposition of the algae along the shoreline results in the production of obnoxious odours which make life miserable for cottagers and shoreline residents. Cladophora has accumulated on the gill nets of commercial fishermen on occasion and has reduced fishing success by so doing. On one occasion, fragments of Cladophora entered the water intake and reached the heat exchange system at the Lakeview Generating Plant. Process water for a few other industries along the lake has been affected as well.

The Commission has an extremely active program underway which includes the testing of chemicals for controlling Cladophora and experimentation with mechanical devices for removal of the algae. Two chemicals have shown great promise and algicidal control is considered to be practical along beach areas which are heavily used for swimming, sunbathing and other recreational purposes.

October, 1964.


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